B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

00494   June, 2017

BIEL-013 : ANTENNAS AND PROPAGATION

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted. Missing data, if any, may be suitably assumed.*

1. (a) State and prove reciprocity theorem for an antenna.   5

   (b) Explain the significance of the term "effective area" of an antenna. How is this related to gain of the antennae ?   5

2. (a) What is understood by the term "uniform linear array" of an antenna ?   3

   (b) Derive an expression for the horizontal pattern of an n-element uniform linear array of vertical radiators.   7

3. Describe the principle of operation of a rhombic antenna, explaining how the various parameters of the antenna control the radiation pattern. Also give its advantages and disadvantages. $7+3=10$

4. How is a loop antenna utilized for calculating the field strength and for determining the direction of an incoming radio signal ? Derive the formula used. 10

5. (a) Explain the important features of the Horn antenna and its working principle. 5

   (b) Describe Helical antenna in normal mode of operation. 5

6. (a) Explain the working principle of a parabolic reflector antenna. 5

   (b) Discuss different types of feed techniques used in parabolic reflector with neat diagram. 5

7. Describe how the radiation pattern, radiation resistance and gain of a given antenna can be measured experimentally. 10

8. Give the definitions of the following terms used in connection with sky wave transmission and indicate the factors on which they depend : $4 \times 2\frac{1}{2} = 10$

   (a) Maximum usable frequency

   (b) Optimum traffic frequency

   (c) Vertical incidence critical frequency

   (d) Skip distance

9. (a) What is the role of ionosphere in long distance radio communication ? 5

   (b) Discuss how the existence of ionosphere causes fading and is disadvantageous for medium wave broadcasting. 5

10. Write short notes on any *two* of the following : 2×5=10

   (a) Plasma Antenna

   (b) Microstrip Arrays

   (c) Non-isotropic Point Sources

   (d) Surface Waves

———————